

F. 141 — Adie 1526	= +0.08
∴ Cent. Obs. Nor. — Adie 1526	= -0.22
F. 132 — Adie 1526	= -0.16
∴ Cent. Obs. Nor. — Adie 1526	= -0.25
F. 150 — Adie 1526	= -0.03
∴ Cent. Obs. Nor. — Adie 1526	= -0.23

The means of these give :

F. Waldo, October, 1883, Cent. Obs. Nor. — Adie 1526	= -0.06
T. Russell, June, 1884, Cent. Obs. Nor. — Adie 1526	= -0.24

The barometer Adie 1526, with a correction of +0.002 inch, equal to 0.05 mm., was adopted by General Greely as the standard of the Signal Service in March, 1887. This barometer has been practically the Signal Service standard since December, 1880. With the correction of +0.002 applied, the difference between pressures as assigned by Cent. Obs. Nor. and Adie 1526 is -0.11 mm. as observed by F. Waldo, and -0.29 as observed by T. Russell, the Cent. Obs. Nor. being lower. These figures do not indicate change in the barometers but personal differences in the way of observing.

October, 1883.

F. 152 — Adie 1555	= -0.27
∴ Cent. Obs. Nor. — Adie 1555	= -0.27
F. 132 — Adie 1555	= -0.29
∴ Cent. Obs. Nor. — Adie 1555	= -0.38

June, 1884.

F. 152 — Adie 1555	= -0.33
∴ Cent. Obs. Nor. — Adie 1555	= -0.33
F. 132 — Adie 1555	= -0.26
∴ Cent. Obs. Nor. — Adie 1555	= -0.35
F. 141 — Adie 1555	= -0.06
∴ Cent. Obs. Nor. — Adie 1555	= -0.31
F. 150 — Adie 1555	= -0.19
∴ Cent. Obs. Nor. — Adie 1555	= -0.39

The means of these give :

F. Waldo, October, 1883, Cent. Obs. Nor. — Adie 1555	= -0.32
T. Russell, June, 1884, Cent. Obs. Nor. — Adie 1555	= -0.34

The barometer Adie 1555 was used with a correction of +0.002 inch, equal to +0.05 mm., therefore the difference between Cent. Obs. Nor. and Adie 1555, as found by Waldo, was -0.37 mm., and as found by Russell, -0.39 mm. This barometer was fitted with a new tube and otherwise altered October, 1885, so the above correction no longer applies.

F. 152 was compared at Yale College Observatory, New Haven, with a Green barometer and with the new standard of the Panama Canal Survey, October 27, 1883, by F. Waldo. At Harvard College Observatory, Cambridge, F. 152 was compared with Newman 68, October 31 and November 1, 1883, by A. Searle and F. Waldo.

F. 152 was compared with the barometers 465 and 1707 at the Signal Service station, Boston, November 2 and 3, 1883, by O. B. Cole and F. Waldo, and with Newman No. 33 at the Canadian Meteorological Observatory, Toronto, by C. Carpmal and F. Waldo.

The same barometer, F. 152, was compared on November 13 and 14, with the Signal Service barometer Adie 1600 at the Maritime Exchange, New York, by F. Waldo, and with Adie 1712 at the Maritime Exchange, Philadelphia, by Mr. Townsend and F. Waldo.

F. 141, 152, 150, and 132 were compared with F. 177 and 178 at the Signal Office, Washington City, in June, 1884, by T. Russell and W. H. Hammon.

The adopted results of all the comparisons are summarized in the following table:

Table of final adopted results.

	mm.
St. Petersburg Cent. Obs. Nor. — Berlin, Preuss. Stat. Bur. F. 76	= -0.04
— Berlin, Nor. Aich. Kom. F. 38	= -0.05
— Berlin, Nor. Aich. Kom. F. Nor.	= -0.25
— Vienna, Cent. Anst. Pistor 279	= -0.08
— Hamburg, Seewarte, F. 9	= -0.50
— Hamburg, Seewarte, Fuess Nor.	= -0.04
— Kew, Normal	= -0.10
— Paris, Int. Bur. F. 137	= -0.18
— Paris, Int. Bur. Nor. I	= -0.24
— Paris, Int. Bur. Nor. II	= -0.20
— Paris, Regnault's Nor. College de France	= -0.05
— Washington, Sig. Ser. Green St'd, with correction of -0.10 mm. applied; Waldo	= -0.19
— Washington, Sig. Ser. Green St'd, with correction of -0.10 mm. applied; Russell	= -0.27
— Washington, Sig. Ser. St'd Adie 1526, with correction of +0.05 mm. applied; Waldo	= -0.11

St. Petersburg Cent. Obs. Nor. — Washington, Sig. Ser. St'd Adie 1526, with correction of +0.05 mm. applied; Russell	= -0.29
— Washington, Sig. Ser. Adie 1555, with correction of +0.05 mm. applied; Waldo	= -0.37
— Washington, Sig. Ser. Adie 1555, with correction of +0.05 mm. applied; Russell	= -0.39
— New Haven, Yale Obs., Green	= -0.02
— New Haven, Green 2725, Panama Canal St'd	= -0.16
— Cambridge, Har. Col. Obs., Newman 68	= +0.19
— Boston, Sig. Ser. No. 465	= +0.35
— Boston, Sig. Ser. No. 1707	= -0.05
— Toronto, Met. Obs., Newman 33, with correction of +0.18 mm. applied	= -0.14
— New York, Maritime Exchange, Adie 1600	= -0.29
— Philadelphia, Maritime Exchange, Adie 1712	= -0.05

In these comparisons of barometers no account was taken of any slight variations there might be in the height of meniscus in open end of the Fuess syphon barometers. The capillary action of the glass on the surface of the mercury will vary a little from time to time with the height of meniscus, depending on the cleanness of the glass. During the time of the comparisons this action was assumed to be constant.

The corrections of the Fuess barometers used in the Table of Final Results to reduce to the Central Obs. Nor. at St. Petersburg are given below, and also the positions of their lower indices as determined in June, 1884, and July, 1886. The corrections of F. 177 and F. 178 are the corrections determined from comparisons with F. 141, 150, 152, and 132 after they had reached Washington City:

F. 141 — 0.25, lower index exactly at zero of graduation.
F. 150 — 0.20, lower index 0.14 mm. above zero of graduation.
F. 152 — 0.00, lower index 0.01 mm. below zero of graduation.
F. 132 — 0.09, lower index exactly at zero of graduation.
F. 177 — 0.11, lower index exactly at zero of graduation.
F. 178 — 0.11, lower index 0.08 mm. below zero of graduation.

#### ATMOSPHERIC ELECTRICITY.

[Translated by Sergeant ALEX. McADIE, Signal Corps.]

The following is from a long and important article by Prof. F. Exner, "Ueber die Ursache und die Gesetze der atmosphärischen Electricität." "Repertorium der Physik, xxii Band. Heft 7-8, 1886." Only that portion bearing on the relation of atmospheric electricity to meteorology is here given, and in an abridged form:

Peltier's theory, in which the earth is considered simply as an electrified ball, isolated in space, and causing by induction a charged atmosphere, is considered by the author as the theory best in accord with all the experimental determinations thus far made.

Of the three different agencies for getting the electrification of the air, viz., by flame, water dropping, and the burning match, the first named, according to Pellat, is the most, and the match the least, efficient of collectors.

All the different observations seem to agree in this, that in ordinary fine weather the potential of the air is positive compared with that of the earth. The condition of cloudiness has a marked effect upon the values of the potential, and especially when thick cumuli clouds are in proximity of the place of observation, variations and occasional negative values are likely to occur. Franklin, Beccaria, Le Monnier, Cavallo, Saussure, and their contemporaries, agree in this. Negative values, as a rule, occur during stormy weather. Quetelet, observing for four years, found only twenty-three instances of negative electricity, and these always during stormy or rainy weather. Birt, in five years, had 14,515 cases of positive and only 665 cases of negative electricity, and these last, as a rule, at times of rapid cloud-formation. Results of a like nature were obtained by Lamont at Munich, by Dellmann at Kreuznach, and Palmieri at Naples. F. Duprez found, on an average, twenty-three cases of positive to one negative indication, and the latter generally during thunder-storms. Everett, from observations in Nova Scotia, obtained similar results. Exner's own experience has been, that in normal weather, omitting local influence, negative electricity is very rare. Dellmann gives as a law, based upon twenty years' experience, that "the atmospheric electricity at a place is, as a rule, of one sign." This important fact has also been commented upon by Wislicenus, at Saint Louis, Mo., and elsewhere. Not only above the earth surface, but also above the sea surface, is the air in its normal condition positively electrified.

In general, the observations referred to above have shown that the difference between the potentials of the air and the ground increases with height. Beccaria noticed that the higher his collecting apparatus the greater the indications. Lamanon and Mongez found always a strong positive indication on the Peak

Table showing the dates of the last snowfall at stations of the Signal Service, east of the Rocky Mountains, for each winter from 1873-'74 to the winter of 1885-'86, inclusive.